Amendments to Claims

1. (Cancelled) ~~A method of designing a screw for use in injection molding or extrusion which screw comprises a screw shaft having a thread spirally positioned about the screw shaft so as to form a plurality of flights, and said screw having a feeding zone, a compression zone and a metering zone, comprising the steps of~~

~~selecting the material to be used in the screw,~~

~~selecting the diameter of the screw,~~

~~selecting the depth and pitch of a flight in the metering zone to provide a volume of a flight in the metering zone,~~

~~selecting a depth and pitch of a flight in the feeding zone based upon the volume of a flight in the feeding zone needed to provide substantially the same mass of material as is present in a flight in the metering zone.~~

2.(Cancelled) ~~The method of claim 1, further comprising the step of selecting the depth and pitch of a flight in the feeding zone such that the depth does not exceed 20% of the diameter of the screw.~~

3.(Cancelled) ~~The method of claim 1, further comprising the step of adjusting the depth and pitch of the flights in the feeding zone so as to give a compression ratio which is about 25% greater than the ratio of the melt density to the bulk density of the material.~~

4.(Cancelled) ~~The method of claim 1, further comprising the step of adjusting the depth and pitch of the flights in the feeding zone so as to give a compression ratio which is about 10% greater than the ratio of the melt density to the bulk density of the material.~~

5.(Cancelled) ~~A method of designing a screw for use in injection molding or extrusion which screw comprises a screw shaft having a thread spirally positioned about the screw shaft so as to form a plurality of flights, and said screw having a feeding zone, a compression zone and a metering zone, comprising the steps of~~

~~selecting the depth and pitch of the flights based upon the material to be used in the screw so that the difference in the ratio of the actual volumetric flow to the theoretical volumetric drag flow of material in the feeding zone and the ratio of the actual volumetric flow to the theoretical volumetric drag flow of material in the metering zone is less than 0.2.~~

~~6.(Cancelled) The method of claim 5, further comprising the steps of~~

~~selecting the material to be used in the screw,~~

~~selecting the diameter of the screw,~~

~~selecting the depth of a flight in the metering zone,~~

~~selecting a rotating speed for the screw,~~

~~calculating the pitch of the flight in the metering zone,~~

~~calculating the theoretical volumetric drag flow of material in the metering zone,~~

~~calculating the theoretical volumetric drag flow of material in the feeding zone by multiplying the theoretical volumetric drag flow of material in the metering zone by the ratio of the melt density to the bulk density of the material,~~

~~selecting the depth or the pitch of a flight in the feeding zone based upon the theoretical volumetric drag flow of material in the feeding zone and then calculating the value of the depth or pitch, whichever was not selected.~~

7.(Cancelled) ~~The method of claim 6, comprising the step of calculating the theoretical drag flow of material in the feeding zone by multiplying the theoretical drag flow of material in the metering zone by up to 125% of the ratio of the melt density to the bulk density of the material.~~

8. (Cancelled) ~~A screw comprising a screw shaft having a thread spirally positioned about the screw shaft so as to form a plurality of flights, said screw having a feeding zone, a compression zone and a metering zone, and means in said screw for providing a mass of material in a flight in the feeding zone that is substantially the same as the mass of material in a flight in the metering zone, wherein said means includes flights formed in the metering zone having a pitch and depth based upon the volume of the material in a molten state and flights formed in the feeding zone having a pitch and depth based upon the volume of the material in a bulk state.~~

9. (Cancelled) ~~In a screw comprising a screw shaft having a thread spirally positioned about the screw shaft so as to form a plurality of flights, said screw having a feeding zone, a compression zone and a metering zone, wherein the pitch of at least a portion of the flights in the metering zone is greater than the pitch of at least a portion of the flights in the feeding zone, the pitch of at least a portion of the flights in the feeding zone is less than the outside diameter of the screw, the pitch of at least a portion of the flights in the metering zone is greater than the outside diameter of the screw, the pitch of at least a portion of the flights increases through the compression zone, and the depth of at least a portion of the flights decreases through the compression zone moving from nearer the feeding zone to nearer the metering zone,~~

~~wherein the improvement comprises that the depth and pitch of the flights are selected based upon the material to be used in said screw so that the mass of material in a flight in the feeding zone is substantially the same as the mass of material in a flight in the metering zone.~~

10. (Cancelled) ~~A screw comprising a screw shaft having a thread spirally positioned about the screw shaft so as to form a plurality of flights, said screw having a feeding zone, a compression zone and a metering zone, means in said screw for providing a difference in the ratio of the actual volumetric flow of material to the theoretical volumetric drag flow of material in the feeding zone and the ratio of the actual volumetric flow of material to the theoretical volumetric drag flow of material in the metering zone is less than 0.2, wherein said means includes flights formed in the screw such that the pitch of at least a portion of the flights in the metering zone is greater than the pitch of at least a portion of the flights in the feeding zone, the pitch of at least a portion of the flights in the feeding zone is less than the outside diameter of the screw, the pitch of at least a portion of the flights in the metering zone is greater than the outside diameter of the screw, the pitch of at least a portion of the flights increases through the compression zone, and the depth of at least a portion of the flights decreases through the compression zone moving from nearer the feeding zone to nearer the metering zone.~~

11.(Cancelled) ~~The screw of claim 10, wherein the pitch of the flights in the metering zone is greater than the pitch of the flights in the feeding zone, the pitch of the flights in the metering zone is approximately equal, the pitch of the flights in the feeding zone is less than the outside diameter of the screw, the pitch of the flights in the feeding zone is approximately equal, the pitch of the flights in the metering zone is greater than the outside diameter of the screw, the depth of the flights in the metering zone is approximately equal; the depth of the flights decreases through the compression zone moving from nearer the feeding zone to nearer the metering zone; and the depth of the flights in the feeding zone is approximately equal.~~

12. (Cancelled) ~~An injection molding machine which includes the screw of any of claims 8-1~~

13.(Cancelled) ~~An extruder which includes the screw of any of claims 8-11~~.

Please cancel Claims 1 - 13 and enter new Claims 14 - 17.

14. (New) A screw adapted for being housed in a cylindrical barrel having a substantially constant inner diameter for injection molding or extruding a polymer composition; said polymer composition having a predetermined bulk density and a predetermined melt density, said screw comprising:

a screw shaft defining a longitudinal axis and having a thread spirally positioned about the longitudinal axis of the shaft;

said spirally positioned thread defining a substantially constant outside diameter of the screw that is less than the inner diameter of the cylindrical barrel;

said spirally positioned thread defining a pitch along said screw shaft;

said screw shaft defining a root diameter that is less than the outside diameter of the screw;

said screw defining a feeding zone, a compression zone and a metering zone along its longitudinal axis;

said pitch of said spirally positioned thread and said root diameter of said screw shaft in said feeding zone and said metering zone defining a compression ratio;

said compression ratio being greater than or equal to the ratio of the predetermined melt density to the predetermined bulk density of the polymer composition and up to 1.25 X the ratio of the predetermined melt density to the predetermined bulk density of the polymer composition.

15. (New) A screw in accordance with Claim 14 wherein said compression ratio is greater than or equal to the ratio of the predetermined melt density to the predetermined bulk density of the polymer composition and up to 1.10 X the ratio of the predetermined melt density to the predetermined bulk density of the polymer composition.

16. (New) A screw in accordance with Claim 14 wherein said compression ratio is equal to the ratio of the predetermined melt density to the predetermined bulk density of the polymer composition.

17. (New) A screw in accordance with Claim 14 wherein the ratio of the predetermined melt density to the predetermined bulk density of the polymer composition is approximately 1.3.

REMARKS

Pending Claims 1 - 13 have been cancelled. New Claims 14 - 17, directed at the screw of the invention have been submitted. Support for the new claims can be found in at numerous places in the specification and in the drawings. Specifically, support in the specification is found at: page 1, lines 15 - 17; page 4, lines 7 - 13; page 6, lines 4 - 16; page 9, lines 9 - 16; page 9 line 34 to page 12, line 28.

This Preliminary Amendment is also to make of record that a Notice of Opposition was filed in Europe against the European counterpart application. Attached is a copy of the Communication of a Notice of Opposition. An English translation of the Opposition will be provided to you as soon as available.

An Extension of Time for U.S. Application No. 10/209,253 (copy enclosed) is being filed by U.S. First Class Mail to the Patent Office concurrently herewith.

In view of the foregoing, allowance of the above-referenced application is respectfully requested.

Respectfully submitted,

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